RECOMMENDED CHANGES TO THE PRESENT SUPERANNUATION PLAN FOR RESEARCH SCIENTISTS AND ENGINEERS TO FACILITATE MAINTAINING A MORE CREATIVE SCIENTIFIC WORK FORCE

Background Report for the Rewards, Recognition

Incentives Working Group

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Background

"it is clear that a steady flow of young new scientists and engineers is critical to the continuing revitalization of a scientific organization's technical excellence" - Lortie Report

The 1994 Report of the Auditor General of Canada noted the need "for more systematic renewal of scientific personnel". The Report goes on to state, "Renewal of skills and knowledge, through the recruitment of newly graduated scientific personnel, is essential if research establishments are to remain creative and productive in the long term" (P. 11-16).

The Report points out that in the SE-RES group of scientists, in particular, the problem of aging is most acute. In 1993, the average age of this group was 47, among the highest in the public service. With reductions in hiring, and the reluctance of employees to leave the public service with less than full pension benefits, the problem of an aging scientific work force can only get worse and result in a severe loss in both creativity and productivity. This in turn will damage the reputations of the labs which will make it much more difficult to attract and recruit first class researchers.

The present wording of the public service superannuation plan which calls for at least 30 years of pensionable service in

order to receive full pension benefits reinforces the aging problem as most SE-RES scientists join the public service around the age of 27-29 years of age. They would have to stay with the public service until they were 57-59 before being eligible for full pensions; an age at which most scientists are long past being creative.

Room must be made in research laboratories for the hiring of new graduates so that "fresh blood" is always entering the system. This can be accomplished by several procedures: an active program of moving people out of the laboratory into other parts of the organization (i.e. throughput management); active culling of poor performers as early as possible; and re-designing the pension plan so that researchers can leave earlier with full pension benefits. Ideally, all three procedures should be in place at the same time to ensure maximum hiring of new scientific staff.

As another working group is supposed to be looking at movement of scientific personnel in to and out of government laboratories, the question of modifying the superannuation plan falls to the Rewards, Recognition and Incentives Working Group.

If government departments are to re-establish a creative work force, they must be allowed the flexibility to modify the pension plan in accordance to the very real needs of their research laboratories.

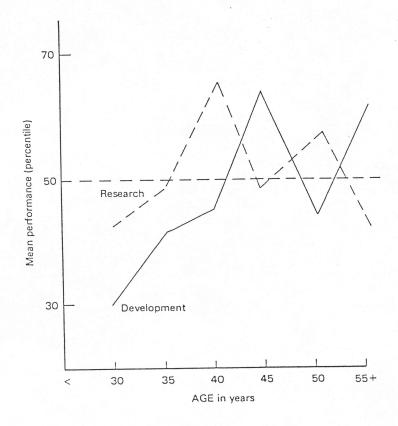
An element that plays a significant role in whether a research laboratory is creative, is the relationship between a researcher's age and his or her level of creativity in solving problems or advancing the state-of-the-art in their field.

Age and Creativity

"There is general agreement that the most creative technical period in scientists' and engineers' careers tends to end in their thirties or early forties, depending on the quality of the individuals and the environment in which they work" - Lortie Report

The above quote is based on numerous studies of R&D management that have taken place over the past 40 years. Studies by H.C. Lehman in the 1950s noted that pioneering discoveries in various scientific fields were most likely to occur in a researcher's late 30's or early 40's, and thereafter declined in frequency. He found that the likelihood of outstanding achievement appeared to peak earlier in a researcher's life in abstract disciplines such as mathematics or theoretical physics, and later in more empirically based disciplines such as geology or biology. He found the peaking to be sharper for the most outstanding achievements, and flatter for minor achievements.

A major contribution to understanding the relationship between age and creativity was done by Donald C. Pelz and Frank M. Andrews in the mid 1960s. In trying to understand the Lehman findings of a "creative peak", they found that there was in fact two performance peaks, one where Lehman had found in the "creative years" 30-40 year age period, and a second, 10 to 15 years later. Ph.D. researchers in research labs "peaked" five years earlier than Ph.D. researchers in development labs (40-44 vs 45-49). Engineers in development labs also appeared to peak in the 45-49 years of age period. Non-Ph.D scientists appeared to peak in the 35-39 years of age period.



* Data summarised from Pelz and Andrews (1976)

Figure 1 Age and scientific performance

Pelz and Andrews suggest that the second peak in performance is due to a synthesis of a lifetimes' progress. They believe that the earlier peak represents work of a more divergent or innovative type, whereas the later peak represents work that is more convergent or integrative in character.

Of even greater interest was their comparison of performance of government researchers with those in other sectors. While the age period for the first peak matched for Ph.D.'s in government and industry, the drop off in performance was much deeper for those employed in government laboratories, and the performance recovery (the second peak) was much weaker.

Edward Roberts (1967) in his examination of the problems of aging scientific organizations states, "An organization showing signs of stagnation usually is staffed with personnel whose average age is increasing or is already high". He goes on to say that new Ph.D. scientists make their major contribution shortly after joining an organization.

He also notes that as an organization's average age increases, its staff turnover declines. The older scientists and engineers are less likely to leave the organization to seek new opportunities. A small turnover diminishes the number of jobs opening up in the R&D group, reducing recruiting activities and restricting the number of new younger people moving into the organization. This causes intensification of the organizational aging phenomena. A turnover rate in the laboratory of approximately 6-8% is considered desirable.

Roberts sites the example of the impact of lack of hiring of new personnel in a government-oriented laboratory with one which had no restriction. In the one where growth had been restricted by fiat, it ended up with an aging technical staff, lower turnover and reduced production of new ideas and practicable developments for the outside world. The lab which was allowed to maintain its average age (at a lower figure) continued to generate its "products" at an unbounded rate. Roberts states that, "the technical effectiveness of an R&D group depends on a continual inflow of new people". A condition that is not being met by Canadian government laboratories.

In his review of career paths and technological obsolescence in R&D staffs in Britain and Japan, McCormick (1995) notes that the relationship between age and effectiveness as a front line R&D worker appears to peak in the late 30s and early 40s in both countries.

Based on the R&D management literature, it is an inescapable conclusion that for a laboratory to maintain its vitality in terms of creativity and productivity, it must be able to hire new graduates. Spaces for these new hires must be made available through moving existing older staff either into other areas of the organization where they can make a positive contribution, or out of the organization all together. The latter can be encouraged through modify the present pension plan so that researchers can leave the public service, with full benefits, at an earlier age, and with fewer years of service.

<u>Current Pension Plan</u>

At the moment, scientific and engineering personnel in government are covered by the general superannuation rules and regulations which, with two exceptions described below, apply to all government personnel.

The basic rate of contribution under the plan is 7.5% of salary, which includes one per cent for indexing benefits. This also includes a percentage payment towards either the Canada Pension Plan or Quebec Pension Plan.

The maximum period for which an employee can pay into the pension plan at the full rate of 7.5% is 35 years.

The assumption is that employees will stay in the public service for at least 35 years, and/or until the age of 60, and thus be entitled to a full or reduced pension upon retirement.

Recent changes to the Public Service Pension Plan improves the portability of the plan by allowing employees who leave before pensionable age to transfer the lump sum value of their earned pension to another plan or a locked-in RRSP. In addition, the interest paid on the returns of contributions will be based on the rate earned by the pension account, rather than on the current 4%.

A full pension from the Superannuation fund is paid to an employee that has at least 30 years of service and has reached the age of 55.

Based on the present pension plan entitlement formula, scientists who generally join the public service around the age of 28-30 would be expected to stay in the public service until they reached the age of 58-60 in order to get a full pension. It is unlikely that many of them could take advantage of retiring at 55 and have the required 30 years of service.

A reduced pension can be obtained at age 50, at the earliest, in the form of an annual allowance.

Information about the formulae used to calculate reduced pensions can be found in the Treasury Board publication, "Your Pension Plan".

The Exceptions

Two groups of public servants have special superannuation plans which allow for earlier retirement with fewer years of pensionable service, with full benefits. The overall justification for this special early retirement benefit is the health and safety of the employees having to work at very high stress jobs where the consequence of error could be many lives put in danger or lost.

Air Traffic Controllers

On June 30, 1981, the Public Service Superannuation Act was amended to provide air traffic controllers with pension benefits "which are more tailored to their career pattern".

Under Section 16(1), air traffic controllers are allowed to retire at age 50 with 25 years of pensionable service and receive a full pension.

An employee age 45 or over with at least 20 years of pensionable service is entitled to an annual allowance. (i.e. reduced pension)

To pay for this speeded up retirement option, air traffic controllers pay an additional 2% of salary to the Superannuation Account (9.5%).

Correctional Service Canada (Prison Guards)

Effective March 18, 1994, prison guards were provided with early retirement benefits provisions.

A contributor to the plan who is at least 50 years of age and who has at least 25 years of pensionable service is entitled to an full pension. (i.e. immediate annuity)

A contributor who is at least 45 years of age and who has at least 20 years of pensionable service is entitled to an annual allowance (i.e. reduced pension).

To pay for this early retirement benefit, contributors must pay an additional 1.25% of salary to the Superannuation account.

Superannuation Plan for Scientists and Research Engineers

As noted in the literature review, creativity in most scientists and engineers is age related. The younger the researcher, the more likely that they will make a substantial creative contribution to their field and their employer. It is vital that research organizations have a steady stream of younger scientists and engineers coming into their laboratories if they are to be revitalized and creative.

The Superannuation Plan should as it does for the air traffic controllers, be more tailored to the needs and career patterns of research scientists and engineers. The Plan should not shackle the researchers to their bench, but allow them to leave to pursue other options, possibly outside the public service at an earlier age where their maturity may be of maximum value to another employer.

The option of being able to retire earlier at full pension is very appealing to many government scientists and engineers. During the Auditor General's audit of government research laboratories in 1994, focus groups were held with bench level scientists and their immediate managers. Among the many topics discussed was the present pension plan. One question that was

discussed was their willingness to pay into the Superannuation Account at a higher rate so that they could leave the public service sooner. The range of positive response by the focus groups to the option of faster pay in and early retirement ranged from 50% for one group to 81% for another group, with the average response being 67%. Another pension-related question asked the focus groups if it was possible to leave the public service at age 50 instead of 55 without financial penalty, would they seriously consider doing so, now or when they reached the age of 50. Again a majority of the respondents said yes (response range from 50-72%).

Some of the focus group respondents said that they felt tied into the plan. Others agreed that the existing plan does keep some people in government who might otherwise leave to try out a new career.

Recommendation

Treasury Board amend the existing Public Service Superannuation Act to allow for the option of an early retirement benefit similar to that presently offered to air traffic controllers and prison guards.

Allowing research scientists and engineers to leave at the age of 50 with full pensions will lessen the risk of stagnation in the government laboratories and allow for the hiring of more younger scientists, and not just on a short-term postdoctoral basis.

Younger scientists and engineers must be hired in order to revitalize the government laboratories, otherwise the labs will have nothing unique to offer their clients and will become an irrelevant part of the Canadian economy and unable to contribute to the quality of life of Canadians, their ultimate client.

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